

What is claimed is:

1. A method for locating defective areas of a disk included as part of a hard disk drive, comprising:

determining a number of detected defects per unit area of said disk;

5 comparing said number of detected defects per unit area of said disk to a threshold amount; and

generating a flag if said number of defects per unit area of said disk is greater than said threshold amount.

2. The method of Claim 1, wherein said step of determining a number of defects per unit area of said disk comprises calculating a sum of defects occurring within a selected portion of said disk.

3. The method of Claim 1, further comprising receiving a first indication that a portion of said disk contains a defect, wherein said step of determining a number of defects per unit area of said disk comprises, in response to receiving said first indication, incrementing a value  $i$  held by a counter by a value  $n$ , wherein said value  $i$  represents said 5 number of detected defects per unit area of said disk, and wherein  $n$  is the amount by which  $i$  is incremented when said indication that a portion of said disk contains a defect is received.

4. The method of Claim 3, further comprising decrementing said value  $i$  held

by said counter by a first amount  $s_1$ , wherein said step of decrementing is completed prior to receiving a second indication that a portion of said disk contains a defect, and wherein  $s_1$  is a rate of decay of said value  $i$  when said value  $i$  is greater than a first amount.

5. The method of Claim 4, further comprising:

receiving said second indication that a portion of said disk contains a defect, wherein said step of determining a number of defects per unit area of said disk further comprises, in response to receiving said second indication, incrementing said value  $i$  held by said counter by said value  $n$ , wherein said value  $i$  represents said number of detected defects per unit area of said disk.

6. The method of Claim 5, further comprising decrementing said value  $i$  held by said counter by a second amount  $s_2$ , wherein said step of decrementing is completed prior to receiving a third indication that a portion of said disk contains a defect, and wherein  $s_2$  is a rate of decay of said value  $i$  when said value  $i$  is greater than a second amount.

7. The method of Claim 1, further comprising receiving a first indication that a portion of said disk contains a defect, wherein said step of determining a number of defects per unit area of said disk comprises:

5 in response to receiving said first indication, incrementing a value  $i$  held by a counter by a value  $n$ ; and  
decrementing said value  $i$  held by said counter by a value  $s_1$ , wherein said value  $i$

represents said number of detected defects per unit area of said disk, and wherein  $s_1$  is a rate of decay of said value  $i$  when said value  $i$  is greater than a first amount.

8. The method of Claim 7, wherein said step of decrementing by said value  $s_1$  is performed after said step of comparing.

9. The method of Claim 7, further comprising:  
receiving a second indication that a portion of said disk contains a defect; and  
a second step of determining a number of defects per unit area of said disk,  
wherein said second step of determining a number of defects per unit area of said disk  
5 comprises, in response to receiving said second indication, incrementing said value  $i$  held  
by said counter by said value  $n$ .

10. The method of Claim 9, further comprising decrementing said value  $i$  by a value  $s_2$ , wherein  $s_2$  is a rate of decay of said value  $i$  when said value  $i$  is greater than a second amount.

11. The method of Claim 10, wherein said step of decrementing by said value  $s_2$  is performed after a second step of comparing.

12. The method of Claim 1, further comprising, in response to generating a flag, sparing at least a first portion of said disk.

13. The method of Claim 1, wherein said number of detected defects per unit area of said disk is determined with respect to a length of a selected track located within a selected one or more writable sectors on said disk.

14. The method of Claim 1, wherein information specifying a location of a detected defect is not stored.

15. A method for identifying defective areas of a disk in a computer hard disk drive, comprising:

selecting a defect density error threshold;

assigning a value n to a defect;

5 in response to receiving a signal indicating that a defect has been detected, adding said value n to a counter value i, wherein n is the amount by which i is incremented after a defect is detected, and wherein i represents a density of detected defects;

decrementing said counter value i by an amount s for each selected portion of said disk in which a defect is not encountered, wherein s is a rate of decay of said value i; and

10 generating a defect density error flag if said counter value i is greater than said defect density error threshold.

16. The method of Claim 15, wherein said value n is one, and wherein said amount s is less than or equal to one.

17. The method of Claim 15, wherein said amount s is selected from a plurality of values, and wherein a one of said values selected depends on said counter value.

18. The method of Claim 15, wherein said amount s is variable and depends on said counter value.

19. The method of Claim 15, wherein said counter value is equal to zero if no

defects have been detected.

20. The method of Claim 15, wherein said defect density error threshold is equal to  $(D-1) \cdot n$ , where D is a selected number of defects.

21. The method of Claim 15, further comprising, in response to said generated defect density error flag, sparing a selected portion of said disk, wherein said selected portion of said disk corresponds to a length of a track on said disk required to store a byte of user data.

2025 RELEASE UNDER E.O. 14176

22. An apparatus for detecting defective areas of a disk included as part of a hard disk drive, comprising:

a summing block;

5 an input for receiving an indication of a defect, wherein a first value is provided to said summing block upon receipt of said indication of said defect;

a down counter, wherein said down counter decrements a first sum received from said summing block; and

10 a comparator, wherein a decremented sum received from said down counter is compared to a threshold value, and wherein a flag is generated if said value received from said down counter is not an acceptable value.

23. The apparatus of Claim 22, wherein upon receipt of a second indication of a defect said first value is added to a decremented sum provided by said down counter to produce a second sum.

24. The apparatus of Claim 22, wherein an amount by which said down counter decrements a sum received from said summing block is varied according to a value of said decremented sum.

25. A hard disk drive, comprising:

    a base;

    a disk comprising a plurality of data tracks arranged concentrically about a spindle;

    a transducer head for reading and writing information to said data tracks, wherein

5     said transducer head is moveable in a radial direction with respect to said disk to address a selected one of said plurality of data tracks;

        a voice coil motor, interconnected to said transducer head, for moving said transducer head with respect to said data tracks;

        a controller, interconnected to said voice coil motor, for controlling a position of

10    said transducer head with respect to said data tracks; and

        a channel, interconnected to said transducer head, wherein a signal derived from information encoded in said data tracks and read from said data tracks by said transducer head is transmitted by said channel, and wherein an area of said disk is spared if a defect density in said area of said disk is greater than a selected amount.

15

26. The hard disk drive of Claim 25, wherein said defect density is determined by calculating a sum of detected defects within a selected area of said disk.